

Follow up was with CXR at 6months followed by CT at 6 months and clinical follow up, 3 monthly.

**Results:** 167 patients with stage IA-IIB disease treated. 55% histologically proven. There were 4 (2.4%) radiologically confirmed local recurrences giving a local control rate of 97.6%. Median survival was 43.2months. 3 year Overall Survival was 56.4% (see Fig 1). Treatment was well tolerated with minimal G3 toxicity (5 patients).

**Conclusion:** Our results suggest that SABR for medically inoperable NSCLC can be safely and effectively implemented in a non-academic institution with appropriate equipment and training. Clinical outcomes are comparable with internationally published series [3], with encouraging 3yr OS rate of 56%. Toxicity is minimal. Longer term follow-up is required to confirm findings and provide data regarding long-term toxicity.

#### References:

- [1] NCCN Clinical practice guidelines in oncology. NSCLC. 2012. [http://www.tri-kobe.org/nccn/guideline/lung/english/non\\_small.pdf](http://www.tri-kobe.org/nccn/guideline/lung/english/non_small.pdf)
- [2] Senan S, Palma D A, Lagerwaard F J. Stereotactic ablative radiotherapy for stage I NSCLC: Recent advances and controversies. *J Thorac Dis.* 2011 September; 3(3): 189-196.
- [3] Timmerman R et al. Stereotactic Body Radiation Therapy for Inoperable Early Stage Lung Cancer *JAMA.* 2010;303(11):1070-1076

#### EP-1213

##### Changes in pulmonary function after single-fraction carbon-ion radiotherapy for stage I NSCLC

W. Takahashi<sup>1</sup>, N. Yamamoto<sup>2</sup>, M. Nakajima<sup>2</sup>, M. Karube<sup>1</sup>, H. Yamashita<sup>1</sup>, K. Nakagawa<sup>1</sup>, H. Tsuji<sup>2</sup>, T. Kamada<sup>2</sup>

<sup>1</sup>University of Tokyo, Department of Radiology, Tokyo, Japan

<sup>2</sup>National Institute of Radiological Sciences, Research Center Hospital for Charged Particle Therapy, Chiba, Japan

**Purpose or Objective:** In patients with inoperable stage I non-small cell lung cancer (NSCLC) or for those refusing surgery, stereotactic body radiotherapy and particle radiotherapy have become therapeutic options. We conducted a Phase I/II study on single-fraction carbon ion radiotherapy (SF-CIRT) for stage I NSCLC that yielded a 3-year survival rate of 75.5% for 218 patients. Until now, the effect of hypofractionated CIRT on pulmonary function (PF) has not been well documented. The purpose of this study was to assess the long-term impact of SF-CIRT on PF in stage I NSCLC patients.

**Material and Methods:** A review of prospectively collected data from SF-CIRT-treated patients was performed. Patients underwent PF tests (PFT) (or: underwent a PF test) immediately before, and at 6, 12, and 24 months after irradiation. Patients who relapsed or needed adjuvant treatment were excluded as these events might affect PF.

#### Results:

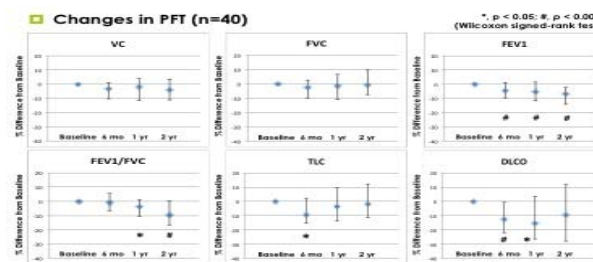
##### ■ Patient characteristics (n = 40)

Median age		75 (51-89)
Male/Female		26 / 14
Stage	T1 (IA)/T2 (IB)	25 / 15
Histology	Adeno./Squamous/NSCLC	30 / 9 / 1
Location	Left upper/Lower	12 / 11
	Right upper/Middle/Lower	9 / 2 / 6
Medical inoperability		19 (47.5%)
COPD*		13 (32.5%)
Dose prescription	44/46/48/50 GyE in single fraction	13 / 12 / 6 / 9

\* FEV1/FVC ratio <70%

Forty patients treated between 2007 and 2012 fulfilled the inclusion criteria. According to the dose escalation study protocol, a median prescribed single-fraction dose of 46 GyE (range, 44-50 GyE) was delivered. All treatment-related complications were self-limited, without any grade 3-5

toxicities. Two years post-CIRT, the mean values of forced expiratory volume in 1 sec (FEV1) [ $-8.4\% \pm 11.9\%$  ( $p < 0.001$ )] and the FEV1 per unit of forced vital capacity (FEV1/FVC) [ $-8.9\% \pm 11.7\%$  ( $p < 0.001$ )] were less than the pre-CIRT values. There were no significant overall changes in total lung capacity, vital capacity, FVC, and residual volume before SF-CIRT and 2 years after SF-CIRT. At 6 months post-treatment, the diffusion capacity of the lung for carbon monoxide (DLCO) was significantly less than the pretreatment value ( $86.7 \pm 32.7\%$  vs.  $78.1 \pm 31.1\%$ ;  $p = 0.002$ ); however, at 24 months post-treatment, the mean DLCO recovered to pretreatment levels ( $86.9 \pm 30.5\%$ ). This might have been due to recovery from non-symptomatic radiation pneumonitis and/or smoking cessation.



**Conclusion:** We found stage I NSCLC patients had good long-term preservation of PF after SF-CIRT. Follow-up PFT revealed the following: Declines in FEV1 and FEV1/FVC were statistically significant but clinically trivial, DLCO decreased temporary, thereafter it tended to recover to pretreatment levels within 2 years.

#### EP-1214

##### Radiotherapy as adjuvant or definitive treatment method in thymic tumours

A. Napieralska<sup>1</sup>, L. Miszczyk<sup>1</sup>

<sup>1</sup>Maria Skłodowska-Curie Memorial Cancer Center and Institute of Oncology, Radiotherapy Department, Gliwice, Poland

**Purpose or Objective:** An evaluation of thymic tumors patient radiotherapy results.

**Material and Methods:** 93 patients (54F [58%], 39M [42%]) aged from 3 (6 children) to 77 (median 48) treated for thymic tumors since 1981. 84 patients (90%) were diagnosed with thymoma, 9 (10%) with thymic carcinoma. Masaoka stage was assessed in 93% (56% stage II, 31%-III, 6%-IV). All patients were irradiated. In 76 cases radiotherapy (RT) followed surgery - in 41 patients after radical and in 35 after incomplete resection. In 17 cases RT was definitive treatment, combined in 14 patients with chemotherapy. Patients were irradiated with fraction dose of 1.1-4.0Gy (median 2.0) to the total dose of 20-68Gy (median 49.5). Patient- and treatment-related factors potentially affecting survival and local control (LC) were evaluated with log-rank test. Survival analysis was performed with Kaplan-Meier method.

**Results:** Tumors relapsed in 17 patients. Metastases occurred after 6-129months (median 10.1) in 12 patients (in 8 in lungs). During the follow-up 17 patients died due to progression(13) or recurrence(4) of the disease. Median overall survival (OS) in the whole group (since diagnosis) was 140.2months. OS was significantly longer in patients with WHO B1 type( $p=0.02$ ), in good performance status (PS)( $p=0.0005$ ), without radiation-induced pulmonary fibrosis( $p=0.02$ ) or second cancer( $p=0.03$ ). Difference in OS between patients treated with radical surgery+RT, non-radical surgery+RT and definitive RT was of borderline significance( $p=0.065$ ). Factors significantly decreasing LC were: male sex( $p=0.04$ ), WHO B2 type( $p=0.01$ ), bad PS( $p=0.0007$ ), presence of metastases( $p=0.003$ ) and second cancer( $p=0.03$ ).